

### **Remarks**

Claims 1 - 20 are pending. Favorable reconsideration is respectfully solicited.

Claims 1 - 17 have been rejected under 35 U.S.C. § 103(a) over Mathur 2003/0229175 ("*Mathur II*") in view of Schuster et al. U.S. 5,854,343 ("*Schuster*"). Applicants respectfully traverse this rejection.

*Mathur II* is not a proper reference, as Applicants conceived the invention and reduced it to practice in Germany, a WIPO Country, prior to the *Mathur II* filing date of February 27, 2003. Evidence of this earlier conception and reduction to practice will be presented in the form of a Declaration under 37 C.F.R. § 1.131 under separate cover. Attached hereto are redacted pages in the German language which were part of the Invention Disclosure filed with the Wacker Chemie Department of Patents, Trademarks, and Licensing in 2002. The text corresponds to the Example 1 and Comparative Example C1 of the application, and the table is the same as the table on page 15 of the application. Removal of *Mathur II* as a reference is respectfully solicited.

*Mathur II* is a continuation-in-part of the *Mathur I* application, which issued as U.S. Patent 6,548,574 on April 15, 2003. The specifications of *Mathur II* and *Mathur I* are not coextensive.

*Mathur I* is directed to a two stage process for preparing filled HTV organopolysiloxane compositions. In the process of *Mathur I*, an untreated premix is first formed in a first mixer by incorporating untreated (hydrophilic) filler and high molecular weight silicone polymer to form an "untreated premix". The "untreated premix" is defined by *Mathur I* to be a dry-appearing powder (which is not damp (col. 1, lines 43 - 44)), "a compounded mixture of a filler with surface silanol groups that have not been reacted with a treating agent, and a high viscosity silicone polymer." Thus, in the *Mathur I* first step, no hydrophobicizing agent nor any structure improver is present.

The *Mathur I* two stage process first directs the untreated silica and high viscosity silicone into a mixer. In the Examples, a Henschel mixer is employed. A Henschel mixer, as is well known, is an upright mixer having rapidly rotating, high shear, vortex-forming blades at the bottom, similar to a kitchen blender. A Henschel mixer is a batch mixer. *Mathur I* also discloses a continuous annular layer mixer, as described at column 4, lines 2- 13, for manufacturing the dry untreated premix. The mixing of the silica and silicone take place in the absence of any silica treating agent. The result is a dry composition with a talcum powder (e.g. baby powder) appearance.

This dry mixture ("untreated premix") is then introduced into a second mixer, in the Example, also Henschel (batch) mixer. At column 4, lines 14 - 20, *Mathur I* discloses other choices for the second mixer: co-rotating intermeshing extruders, counter-rotating intermeshing or non-intermeshing extruders, single screw reciprocating or non-reciprocating extruders, and co-rotating, self-wiping extruders. No reciprocating kneader is literally mentioned, although it may possibly be that a reciprocating extruder can be a reciprocating kneader.

In the second mixer, additional high viscosity silicone (silicone gum), crosslinkers, and silica treating agents are added and mixed to form the final HTV silicone rubber composition.

Thus, to summarize, *Mathur I* discloses a two stage process wherein in the first step, a dry, untreated premix of untreated silica and high viscosity silicone is prepared, and this dry mixture is then further processed in a second mixer with additional silicone and other additives.

In theory, *Mathur I* discloses a two-stage continuous process, although his example is a two-stage batch process. If the continuous annular layer mixer is used for preparing the untreated premix and a twin screw extruder is used as the second mixer, the result would be a continuous process. Importantly, *Mathur I* begins with untreated (hydrophilic) silica, and does not treat the silica (to react surface silanol groups) until the second mixing stage. The entire aim of *Mathur I*, and the problem he solves, is avoiding a damp, treated premix and instead providing

a dry untreated premix which can be conveyed easily as a powder, which is difficult with damp premixes.

*Schuster* is not directed to the preparation of HTV silicones, but to the preparation of LSR (liquid silicone rubber), a very different product. HTV rubber is of very high viscosity in the uncured state, a plastic solid or gum, while LSR silicone rubber is a liquid. Incorporation of hydrophilic filler (as taught by *Mathur I*) into such compositions is ordinarily not possible, and thus LSR compositions employ hydrophobicized filler.

*Schuster* discovered that LSR rubbers could be uniformly compounded in a continuous process if a kneading cascade as shown in his drawing is used instead of a twin screw extruder or reciprocating kneader, along with treated silica. *Schuster* does not disclose the use of untreated, hydrophilic silica, since he knew that such silica would be inoperative in LSR formulations. That this is so is further evidenced by the Rule 132 Declaration of Dr. Schuster himself, who employed a kneading cascade with untreated filler as a comparative example. This Declaration will be submitted under separate cover. The filler compacted greatly, tailback into the charging funnel occurred, and the matrix finally discharged from the devolatilizing vessel was inhomogeneous, had a high viscosity, and could not be handled further: totally unusable.

The present invention is directed to a continuous process for preparing HTV silicone rubber. Prior attempts to use conventional mixing devices such as twin screw extruders, reciprocating kneaders, etc., had been unsuccessful. Partial success had been achieved by Achenbach et al. U.S. Patent 6,323,262 ("*Achenbach*"), which shares coinventor Manfred Heisler with the present application. In *Achenbach*, various types of mixing tools are disclosed at column 5, lines 17 - 27. Success was achieved by *Achenbach* by recycling a portion of the continuously produced product back to the inlet of the reactor. This product recycle allows numerous mixers to be used. However, *Achenbach* indicates in column 1, that highly filled silicone rubbers are very difficult to process, for example in a reciprocating kneader, due to the formation of crumb and the necessity for reinversion. See *Achenbach* at column 1, line 46 to column 2, line 43. Note particularly column 2, lines 37 - 43:

All known continuous processes for producing highly filled, highly viscous silicone compositions such as HTV silicon compositions suffer from these disadvantages. In general, the problems associated with phase inversion are all increasingly more serious with higher filler content, higher specific surface area of the filler, and increased filler-polyorganosiloxane interaction.

As indicated previously, *Achenbach* solved these problems by recycle of a portion of the product rubber back to the mixer. However, as explained in the present specification, this recycle is complicated to effect industrially, and moreover, significantly reduces throughput. In addition, the initial product will have to be reworked, perhaps as an additional recycle, because its composition and homogeneity will differ considerably from material produced well into the run.

Applicants solved these problems by first kneading filler and silicone in a kneading cascade, the product of which is input directly into a reciprocating kneader. It was surprisingly discovered that the product was of higher quality than that produced by *Achenbach's* process, without requiring recycle of a portion of the product. The storage stability was good, better than HTV produced with a kneading cascade alone, or with a reciprocating kneader without recycle. The amount of volatiles was reduced by some 300%, and the compositions were less discolored than all the other methods. Even more surprising and unexpected was that the combination of the kneading cascade and reciprocating kneader allowed the use of hydrophillic (untreated) filler, whereas *Schuster* required treated filler.

It appears to be the position of the Office that it would be obvious to substitute the kneading cascade of *Schuster* for the twin screw extruder used in the first stage of *Mathur II*. Applicants believe this is far from obvious, particularly in view of the surprising and unexpected results achieved. However, as *Mathur II* is not a proper reference, and as *Mathur I* does not disclose use of a twin screw extruder in his first mixing step, the rejection must be withdrawn for this reason. However, there are numerous other inventive differences between the subject invention and the references.

First, Applicants submit that *Mathur I* and *Schuster* are not properly combinable. It is well established that one cannot simply "pick and choose" isolated teachings from a reference while disregarding other salient features of the reference. *In re Wesslau*, 147 USPQ 391, 393 (CCPA 1965). These "other salient teachings" must be incorporated into any rejection based on a combination of references. That is not to say that all teachings in a reference must be included in a rejection. The issue is what the reference, when considered as a whole, would direct the skilled artisan to do. For example, in a curable polymer system such as a moisture curing silicone composition, if the reference states that a particular catalyst must be used with the other composition components, it is not proper to take from the reference only the other composition components, without also including the catalyst. The catalyst is a "salient" teaching. *Wesslau* was decided in 1965, more than 40 years ago, and is still the law. It has never been overruled, and could not be overruled except by a Court sitting *en banc* (a court panel of judges cannot overrule a prior panel of equal size of the same lower court; fundamental U.S. law).

Here, *Schuster* is directed to LSR compositions, and requires a hydrophobic (treated) filler. An untreated filler cannot be used in the *Schuster* process. However, *Mathur I* requires that his filler be untreated. These teachings are diametrically opposed, and both are salient features of the references. Such references with opposing teachings cannot be combined. *In re Grasselli*, 218 USPQ 769 (Fed. Cir. 1983).

One skilled in the art would also not be motivated to replace *Mathur I*'s first mixer with a kneading cascade of *Schuster*, because *Schuster* teaches that it is necessary to use hydrophobic filler in his kneading cascade while *Mathur I* teaches that hydrophobic filler cannot be used. These references cannot be combined. The rejection of the claims as they might apply to *Mathur I* (since *Mathur II* is not longer a reference) is respectfully solicited.

Claim 13 requires the filler to be a prehydrophobicized filler. This claim is separately patentable, as *Mathur I* is adamant that only untreated filler be used in his first stage, thus teaching away from the subject matter of claim 12. Teaching away is strong evidence of non-obviousness. *W.L. Gore v. Garlock*, 220 USPQ 303 (Fed. Cir. 1983).

Claim 15 requires organopolysiloxane, untreated filler, and hydrophobicizing agent be added to the kneading cascade. Again, *Mathur I* is very adamant that the only ingredients added in his first stage are untreated filler and high viscosity silicone. *Mathur I* expressly teaches away from adding treating agents to his first stage - they are added to the second stage. Teaching away is strong evidence of non-obviousness.

Claim 16 requires structure improver to be added to the kneading cascade. *Mathur I* teaches against doing so. Claim 16 is separately patentable.

New claim 18 (support, page 12, lines 15 - 17; page 3, lines 27 - 30) requires the composition exiting the kneading cascade to be a viscous, homogenous cohesive composition, i.e. similar, as indicated on page 3, to the final finished rubber product. This is a highly preferred embodiment also not taught or suggested by the references, whether alone or in combination. *Mathur teaches* that the product of his first stage be a dry, untreated premix, and teaches against even damp mixtures (damp with silicone). *Mathur I* teaches away from the subject matter of claim 18.

Claim 19 requires that either or both of a hydrophobicizing agent or structure improver be added to the kneading cascade. *Mathur I* teaches against doing so. *Mathur I* discloses and defines his "treating agents" in column 3, lines 8 - 29. All these are hydrophobicizing agents or structure improvers. *Mathur I* teaches against adding these in his first stage.

Claim 20 requires a silanol-functional organopolysiloxane structure improver to be used, in conjunction with a hydrophilic filler. *Mathur I* teaches against adding a structure improver to the first stage, and *Schuster* teaches against use of a hydrophilic filler.

Applicants respectfully submit that the claims are patentable. This is not a case such as *KSR v. Teleflex*, 550 U.S. 398 (2007), where the invention was a simple mechanical invention (gas pedal), only limited structural choices were available, the result was predictable, and there were no contrary teachings in the references. Here, *Mathur I* discloses a two stage

mixing process which, in the first step, produces dry untreated premix in a first mixer, and then produces the final rubber product in a second mixer. The rejection appears simple on its face: substitute the *Schuster* kneading cascade for the first mixer of *Mathur I*, and select a reciprocating kneader for the second *Mathur* mixer. However, as explained in detail earlier, there are many reasons why this "substitution and selection" would not be made by one of skill in the art. Contrary to KSR where none of the combined references contained any contrary teachings, that is not the case here.

This can be seen quite simply by the name of the mixer used in *Schuster*: a kneading cascade. Kneading is a method for processing doughs, pastes, and gums, but has never been applied to powdery mixtures as required by *Mathur I*. One desirous, as in *Mathur I*, of preparing an untreated premix, would not look to the use of a kneading cascade, which is used to process viscous liquids and semisolids.

Moreover, unlike KSR, there are numerous choices for each mixer, many more than those listed by *Mathur I*. For example, there are two roll and three roll mixers, Banbury mixers, rotor/stator mixers, mixing turbines, sigma blade mixers, dough mixers, etc. Among the two mixers, there are hundreds of combinations, not the very limited few of KSR.

These mixers are expensive. One skilled in the art would have to have a high probability of success before spending tens or hundreds of thousands of dollars for a mixer to simply experiment with. In all fairness, what would one skilled in the art, reading *Mathur I*, be directed to? Would he look to *Schuster* to replace *Mathur I*'s first mixer? Why? Would he look to *Achenbach* instead? How about Heisler U.S. 2001/0047049 ("*Heisler*"), which discloses numerous types of mixers. Why not Heisler U.S. 6,124,392 which employs an oscillating single shaft pilgrim kneader? Why not any one of many, many silicone-related patents disclosing a wide variety of kneaders?

The truth is, *Mathur I* does provide some direction as to the type of kneader. This direction is provided by his examples, which employ Henschel batch mixers for both mixers, presumably *Mathur*'s best mode, and his preference for continuous annular layer mixer, disclosed

in the patent he cites for this purpose, U.S. 5,018,673, when a continuous process is desired. Both these mixers have rapidly rotating blades which "cut and dice" the high viscosity silicone and untreated filler to produce a powdery premix.

Because *Mathur* desired to produce a dry untreated premix in his first step, one skilled in the art, trying to select a "better" mixer than a Henschel mixer or a continuous annual layer mixer, both of which use a "cutting" action, would definitely not look to *Schuster*, as his kneader did not produce a dry mixture, and is a kneader, a device which constantly folds and unfolds its contents, similar to what a baker does in kneading bread. The lack of the high shear, rapid cutting action of such a mixer would dissuade one skilled in the art from using it. One skilled in the art of HTV silicone would not look to *Schuster* to provide a substitute for the first mixer of *Mathur I*.

Applicants submit that the claims are now in condition for Allowance, and respectfully request a Notice to that effect. If the Examiner believes that further discussion will advance the prosecution of the Application, the Examiner is highly encouraged to telephone Applicants' attorney at the number given below.



The Petition fee of \$130.00 is being charged to Deposit Account No. 02-3978 via electronic authorization submitted concurrently herewith. The Commissioner is hereby authorized to charge any additional fees or credit any overpayments as a result of the filing of this paper to Deposit Account No. 02-3978.

Respectfully submitted,

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kammerspezifisch sehr exakt festgelegt werden kann. Eine derartig exakte Einflußnahme ist mit einer Zweiwellenmaschine nicht möglich.

- Die Kautschukmasse ist spätestens in der letzten Kammer der „Conterna“ vollkommen homogen wie ein fertiger Kautschuk, zudem hat sie eine über die Antriebe der einzelnen Knetkammern reproduzierbar zugeführte Knetleistung erfahren.

## Beispiele

Der Fortschritt gegenüber Wa9850 und auch Wa9535 kann über ein erfindungsgemäßes Beispiel (Conterna/Bussknetter) demonstriert werden. In den erfindungsgemäßen und nicht erfindungsgemäßen Beispielen in Wa9850 wurde ein Durchsatz von ca. 50kg/h angegeben (Bussknetter LR100/19D). Bei der vorgegebenen Rezeptur ist der Durchsatzbereich um 50kg/h als der maximal erreichbare Durchsatz mit diesem Bussknetter LR100 anzusehen.

Das folgende **erfindungsgemäße Beispiel (Conterna/Bussknetter)** läuft mit gleichen Rezepturkomponenten wie in Wa9850. Rezeptur siehe Wa9850, Seite 7 Zeile 33 bis Seite 8 Zeile 2.

**1.Stufe: „Conterna“,** 6 Kammern je 10l Volumen, Gesamtdurchsatz 200kg/h

In die Kammer 1 wird das Polymer eindosiert (120kg/h), zudem der Weichmacher (20kg/h), in die Kammer 2 der Füllstoff (60kg/h). Der Gesamtdurchsatz betrug folglich ca. 200kg/h. Die Drehzahlen in den Kammern 1-4 liegen bei 35 UpM. An Hand der Leistungsaufnahme der Einzelantriebe der Kammern kann registriert werden, dass in der 2. Und 3. Knetkammer wohl eine brockige Konsistenz der Masse vorliegt. In der 4.Knetkammer ist die Leistungsaufnahme ruhiger und höher, hier liegt eine homogene zusammenhängende Masse vor. Kammer 1 - 4 wurden mit 50Upm betrieben. In den Kammern 5 und 6 wird mit 40 UpM nachgeknetet und gleichzeitig erfolgt aus Kammer 6 der Produktaustrag. Die 6 Kammern werden nicht gekühlt und nicht geheizt, die Temperaturen ziehen von ca. 45°C in der 1. Stufe auf ca. 150°C in der 6. Kammer an.

Ohne Zwischenlagerung wird der Kautschuk einem Bussknetter vom Typ LR100 zugeführt. Da beide Anlagenteile in ihrer Dimensionierung nicht aufeinander abgestimmt sind, mussten der Produktstrom im Verhältnis 120:80 geteilt werden. Hierzu benutzten wir eine Breitschlitzdüse, die den Produktstrom über einen eingeschweißten Steg in den gewünschten Massenstrom teilt. 80kg/h werden ausgeschleust (**=Probe 1, nicht erfindungsgemäß**). Die restlichen 120kg/h Kautschuk werden in den oben erwähnten Bussknetter dosiert und der 2.erfindungsgemäße Verfahrensschritt wird verifiziert.

## 2.Stufe: „Busckneter LR100“

Der uns zur Verfügung stehende Busckneter vom Typ LR100 gliedert sich in 5 Zonen (Schüsse) mit folgendem Aufbau: 1.Zone 3D, 2. – 5.Zone jeweils 4D. Alle Zonen sind über Stauringe voneinander getrennt. Mit Hilfe einer Vakuum-Wasserringpumpe beaufschlagten wir die Zonen 2 –5 mit einem Vakuum in Höhe von 100mbar(abs.). Die Temperierung der einzelnen Schüsse und der Welle des Busckneters wählten wir so, daß sich beginnend ab dem 2.Schuss bei einer Wellendrehzahl von 150 UpM eine Produkttemperatur längs des Kneters von ca. 180 -200°C einstellte. Der über die Conterna produzierte Kautschuk mit einem Massenstrom von ca. 120kg/h wird in die Zone 1 des Busckneters mit einer Produkttemperatur von ca. 150°C dosiert. In den Zonen 2 – 5 wird er intensiv geknetet und dabei flüchtige Bestandteile der Kautschukmasse optimal entfernt. Über eine gekühlte Austragsschnecke wird der Kautschuk ausgetragen und kann als **erfindungsgemäße Probe 2** untersucht werden.

Als Vergleichsbeispiele dienen das Beispiel 1(erfindungsgemäß) und Beispiel 3(nicht erfindungsgemäß =WA9035) in WA9850. Die dort aufgeführten Versuche wurden wiederholt, die Kautschukproben wie folgt bezeichnet: Beispiel 1 = **Probe 3 (nicht erfindungsgemäß)**, Beispiel 3 = **Probe 4 (nicht erfindungsgemäß)**

### Prüfung der hergestellten Siliconkautschukmassen

-Die Proben 1 – 4 wurden von uns hinsichtlich ihrer **Lagerstabilität** über einen Zeitraum von 3 Monaten beurteilt, also Messungen der Mooney-Viskosität in definierten Zeitintervallen, Beurteilung des Verhaltens auf dem Walzwerk. In der Tabelle ist nur die qualitative Probenbeurteilung nach 3 Monaten aufgeführt.

-Am Rohkautschuk wurde ferner die **Flüchtigkeit** bei 200°C gemessen.  
Bedingungen: 1g Kautschuk/4h/200°C , Angabe in %Flüchtige.

Der Kautschuk wurde

- a)-mit 0,7%Dicumylperoxid(=Vernetzer C1) 15 Minuten bei 165°C und
- b)-mit 1,5%Di(2,4-)Dichlorobenzoyl)peroxide(50%ig)(=Vernetzer E) 10 Minuten bei 135°C

in einer beheizten Presse zwischen Platten vulkanisiert. Die Vulkanisate anschließend im Umlufschrank 4h bei 200°C getempert, danach das Aussehen dieser Vulkanisate beurteilt, also den Grad der **Verfärbung**.

1= nicht verfärbt, 4= stark verfärbt

Probe	Lagerstabilität	Flüchtigkeit	Verfärbung Vulkanisate Vern. E	Vern. C1
1	mittel	1,9%	3	4
2	gut	0,5%	1	1 – 2
3	gut	1,4%	1 - 2	2 - 3
4	schlecht	1,3%	1 - 2	2 - 3